

Population Preferences for Health Care in Liberia: Insights for Rebuilding a Health System

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Objective. To quantify the influence of health system attributes, particularly quality of care, on preferences for health clinics in Liberia, a country with a high burden of disease that is rebuilding its health system after 14 years of civil war.

Data Sources/Study Setting. Informed by focus group discussions, a discrete choice experiment (DCE) was designed to assess preferences for structure and process of care at health clinics. The DCE was fielded in rural, northern Liberia as part of a 2008 population-based survey on health care utilization.

Data Collection. The survey response rate was 98 percent with DCE data available for 1,431 respondents. Mixed logit models were used to estimate the influence of six attributes on choice of hypothetical clinics for a future illness.

Principal Findings. Participants' choice of clinic was most influenced by provision of a thorough physical exam and consistent availability of medicines. Respectful treatment and government (versus NGO) management marginally increased utility, whereas waiting time was not significant.

Conclusions. Liberians value technical quality of care over convenience, courtesy, and public management in selecting clinics for curative care. This suggests that investments in improved competence of providers and availability of medicines may increase population utilization of essential services as well as promote better clinical outcomes.

Key Words. Postconflict, health system strengthening, discrete choice, clinical care, quality of care

Liberia has recently emerged from 14 years of civil war, which killed tens of thousands, destroyed livelihoods of many survivors, and obliterated the health care system (National Transitional Government of Liberia 2004). Eighty percent of clinics across the country were shuttered during the war by looting, destruction, and flight of health personnel (National Transitional Government of Liberia 2004). As a result, most of the rural population had little access to

modern medical care, instead relying on traditional providers, such as traditional healers and midwives and “black baggers” or traveling medicine sellers.

Liberians suffer from high mortality and morbidity, resulting from a combination of poor living conditions and lack of quality health care. Infectious diseases are a major contributor to ill health and lost productivity: for example, one-third of Liberians suffer from malaria each year (WHO 2008). Most child deaths are also caused by infectious disease ranging from malaria to pneumonia and diarrhea. The result is an under-five mortality rate of 110/1,000 live births—a level 14-fold that of the United States (World Health Organization 2010). Maternal mortality—a measure of the safety of pregnancy and childbirth and therefore an indicator of the effectiveness of the health system—is among the highest in the world at 994 per 100,000 live births (Liberia Institute of Statistics and Geo-Information Services, Ministry of Health and Social Welfare, National AIDS Control Program, and Macro International Inc. 2008). More atypical for a low-income country is the large burden of mental illness with four in 10 Liberians reporting symptoms consistent with major depression and a similar number with posttraumatic stress disorder (PTSD) (Johnson et al. 2008). In 2010, Liberia was ranked 162 out of 169 countries on the Human Development Index—a measure that combines life expectancy, income, and educational attainment (UNDP 2010).

Today, the government supported by the United States and other foreign donors is in the throes of an ambitious program to rebuild the health care system (Figure 1). One major initiative, the USD 52 million Rebuilding Basic Health Services (RBHS) program, aims to reconstruct and equip more than 100 of the 330 clinics in the country as well provide training to upgrade the skills of nurses and clinic managers. Most clinics and hospitals in Liberia are managed by contracted national and international NGOs with payment based in part on their performance in extending coverage of essential health services and assuring quality (John Snow International 2009). The focus of health system development efforts is rural Liberia, where access to care is poorest.

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Figure 1: Newly Renovated Rural Health Clinic in Liberia



In order to improve population health, new health services have to be used. Our previous work on health care utilization in Liberia suggests that rural Liberians disproportionately use informal or traditional sources of care compared with modern health care (Kruk et al. 2010). Data from Demographic and Health Surveys show the low utilization of basic health care, particularly in rural areas, where only 25.5 percent of rural women delivered with a health professional and 32.5 percent of 2-year-olds had all required immunizations. Although pneumonia is a major killer of young children, more than four in 10 children under the age of 5 with pneumonia symptoms were not taken to a health professional (Liberia Institute of Statistics and Geo-Information Services, Ministry of Health and Social Welfare, National AIDS Control Program, and Macro International Inc. 2008).

Research on health care utilization in low-income countries has typically focused on demand-side determinants of access to health services. The underlying assumption in this work is that the decision to use health care is determined by the perceived need and users' personal circumstances and modified by distance and affordability of facilities. This notion is problematic for two reasons: first, it does not address the role of individual preferences for the nature of health care provision, which may be influenced by more than user demographics and service availability. It is likely, for example, that the structure and organization as well as the processes of care are important in

informing decisions about utilization and thus explaining some of the variations in the use of health care (Andersen 1995; Phillips et al. 1998). Second, understanding the determinants of health care utilization that stem from the health system may suggest interventions that might increase use of essential health services in the short to medium term, while longer-term societal transformations (e.g., improvement in women's education or wage employment) are underway.

To the extent that population preferences for health care are influenced by the structure and processes in health systems, it is not obvious which elements are important. In Liberia, there is concern, for example, that after a long war the population may not have confidence in the health system that is largely run by foreign nongovernmental organizations (NGOs). There is also an assumption that given widespread poverty, affordability would largely determine health service utilization. The importance of technical and nontechnical quality of care and service convenience is unknown, yet these have important implications for health system organization and planning.

In this study, we sought to quantify the role of technical quality, provider courtesy, convenience, affordability, and organization and management of health care on preferences for health clinics for treatment of episodic illness in rural Liberia. There are few studies of consumer preferences for health care in Africa and even fewer in postconflict countries (Hanson et al. 2005; Kruk et al. 2009, 2010c).

METHODS

Study Area and Sampling

The Republic of Liberia is a low-income country located on the West African coast. The country's population was recently estimated to be 3.5 million. Liberia is currently recovering from civil conflict that began in 1989 and lasted until 2003. Fighting initially began in Nimba County, located in the north central region of the country. Nimba currently has 462,000 residents, making it the second most populous county in Liberia. Residents of Nimba County are served by 49 health facilities, the vast majority of which are managed by international NGOs.

A three-stage population-representative rural sample from Nimba County was drawn using data from the 2008 National Census, obtained from the Liberia Institute of Statistics and Geo-Information Services (LISGIS). In the first stage of sampling, populations of census enumeration areas were used

to select 50 areas with probability proportional to size. Next, full listings of households were obtained from LISGIS and were used to randomly select 30 households from each enumeration area. Finally, a Kish Table was used to randomly select a respondent from all eligible individuals in each sampled household. Eligible individuals were all those older than 18 who resided within the selected household. Household was defined as all individuals that reside under the same roof for more than 6 months of each year and eat from the same pot.

Discrete Choice Experiment (DCE)

A DCE was conducted as part of a larger household survey. DCEs—also called stated choice experiments or conjoint analysis—establish preferences for a good, service, or program by having respondents choose one of several hypothetical alternatives described by a set of characteristics. This method is grounded in random utility theory, which posits that the value of a good or service to the individual is a linear function of its attributes and unobserved individual factors, such as taste (Ryan 2004). In health care, DCEs have been used to assess patient preferences for health services and public health measures, and physician preferences for rural versus urban practice, among others (Ryan et al. 2000; Sculpher et al. 2004; Hanson et al. 2005; Hanson and Jack 2010). DCEs have been shown to be easy to administer and have demonstrated good test–retest reliability and convergent validity with related instruments, such as standard gamble (Vick and Scott 1998; Ryan et al. 2001). With the addition of graphic representations of attribute levels, DCEs have been shown to be viable for use in populations with low literacy (Hanson et al. 2005; Kruk et al. 2009). More information on DCEs is provided in the Appendix SA2. The aim of the DCE was to assess which clinic structures and processes influenced choice of clinic for treatment of illness. We were especially interested in understanding the influence of quality of care, relative to cost and convenience.

DCE Design

Designing a DCE has three steps: identifying attributes (clinic characteristics), assigning levels, and choosing scenarios. First, to identify attributes that influence clinic choice, we conducted a review of the literature and held discussions with policy makers in the Ministry of Health and local health providers. Based on this, we developed a candidate list of attributes for the DCE. Second, to reduce the number of attributes and assign levels we held four focus groups, each with six to eight participants living in villages not

Table 1: Descriptive Statistics for Population-Based Sample from Nimba County, Liberia, 2008 ($N = 1,434$)

	<i>n (%)</i>
Demographics	
Female	659 (46.0)
Age (years)	
18–29	469 (32.7)
30–49	618 (43.1)
≥ 50	346 (24.1)
Education	
Never attended school	607 (42.3)
Any primary school	446 (31.1)
Any high school	369 (25.7)
Any college	12 (0.8)
Household assets	
Electricity	29 (2.0)
Mobile phone	196 (13.7)
Radio	525 (36.6)
Number of conflict-related traumatic experiences, mean (SE)	17.3 (0.1)
Symptoms of posttraumatic stress disorder	687 (47.9)
Health care utilization	
Number of visits to health system in past year, mean (SE)*	5.0 (0.2)
Number of visits to informal providers in past year, mean (SE) [†]	26.5 (1.4)
Attitudes to NGO management of health care	
Satisfied with current system of NGO management	1,135 (79.1)
Wants government to manage health system in 10 years	848 (59.1)
Wants government and NGOs to manage system in 10 years	379 (26.4)
Wants NGOs to manage system in 10 years	100 (7.0)

*Includes clinics, health centers, and hospitals, both public and private.

[†]Includes traditional healers (country doctors), spiritual healers, traveling pharmaceutical salespersons, private pharmacies, and traditional midwives.

NGO, nongovernmental organizations.

selected into the survey. Focus group participants identified the most important attributes of health clinics to them, ranked them, and discussed how these influenced their choice of clinic. They also specified a locally relevant range of levels for each (e.g., realistic cost range), which were discussed in the group.

The third step is selecting a subset of scenarios. Final DCE attributes included waiting time, respect demonstrated by facility workers, medicine availability, quality of the physical exam, cost, and facility manager (Table 1). These gave rise to 240 possible different clinic combinations in the full factorial design ($5^1 \times 2^4 \times 3^1$). To minimize the burden for respondents, five sets (blocks) of seven choice tasks were selected using an experimental design that

optimized D-efficiency; that is, maximized orthogonality and level balance, and minimized overlap among attribute levels (Sawtooth Software Inc., Sequim, WA, USA). Such designs permit estimation of main effects and interactions between attributes. We added one fixed choice to all questionnaires to assess internal predictive validity of the model. The statistical efficiency of this fractional factorial design was tested in Sawtooth Software. An artist created graphics for the attributes and levels to facilitate use of the DCE with this low-literacy population.

The final questionnaire included eight clinic choice tasks. Respondents were asked to select where they would obtain care when sick. Respondents could select Clinic A or B or a traditional healer—the “opt-out” scenario. Opt-out scenarios are used in DCEs to exclude respondents who are not in the market to buy the good or service in question—in this case, people who would prefer a traditional healer to modern health care. We piloted the instrument, testing for comprehension and cognitive ease of the DCE content and graphics with 75 residents of Nimba County and used the information to make final revisions to the DCE before fielding.

Non-DCE Variables

The survey instrument included information on demographics, formal and informal health service utilization, and traumatic experiences related to conflict. A relative index of household wealth status was constructed using principal component analysis of household assets (Filmer and Pritchett 2001). Those households that were in the lowest quintile according to this index were defined as “most poor.” Conflict-related traumatic experiences and symptoms of PTSD were assessed using the Harvard Trauma Questionnaire (HTQ), a tool that has been used widely in developing country settings (Scholte et al. 2004; Roberts et al. 2009). The HTQ includes 40 questions about material deprivation, bodily injury, forced confinement, injury to or death of loved ones, and witnessing violence. Respondents that were in the highest quartile of reported traumatic experiences were defined as highly traumatized. Respondents were deemed to have symptoms consistent with PTSD based on established thresholds (Mollica, Massagli, and Silove 2004). Formal health care utilization was defined as visits to public and private clinics, health centers, and hospitals in the previous year. Similarly, informal health care utilization was defined as visits to traditional healers (country doctors), spiritual healers, traveling pharmaceutical salespersons, private pharmacies, and traditional midwives in the previous year. Respondents were asked how satisfied they were

with their country's current reliance on NGOs for the provision of health services. Similarly, they were asked who they felt should be providing health services in 10 years, whether the government, NGOs, or the government and NGOs jointly.

Survey Administration

The survey was administered by 12 trained interviewers in participants' homes. Interviewers introduced the choice task and showed respondents a graphic representation of the DCE and described the alternatives using a standard script to ensure consistent interpretation. As is standard, respondents were asked to imagine making a real choice, take into account only the attributes described, and instructed that there were no right or wrong answers. Data were recorded using personal digital assistants. The full survey took approximately 1 hour to complete.

All data collection occurred between October and December 2008. The Liberia Ministry of Health and Social Welfare and the Institutional Review Board at the University of Michigan provided ethical approval for the study. Written consent was obtained from all respondents.

Statistical Analysis

Data were cleaned and transferred to *Stata* v.11 (StataCorp 2009). Univariate statistics were calculated for demographic and health care utilization. A mixed logit model was fit to DCE data to estimate attribute utilities. This model estimates the likelihood of choosing a clinic as a linear additive function of the attributes of that clinic conditional on attributes of the other clinic and having the option of a traditional healer. The effect of respondent characteristics (e.g., age, gender, wealth) on clinic choice enters the model as a set of interaction terms between these variables and clinic attributes (Hole 2007). The coefficients for each attribute level represent the gain or loss in utility from moving from the base level to that level and can be interpreted by calculating the marginal rate of substitution between one attribute level and another. When cost is one of the attributes, one obtains the willingness-to-pay. This interpretation of coefficients rests on a key axiom of random utility theory that subjects are willing to trade one attribute against another to maximize their utility, that is, engage in compensatory decision making (Scott 2002).

The mixed logit model generalizes the standard logit by allowing the parameters associated with the observed variables (i.e., attribute levels in DCEs) to vary randomly across individuals. This captures heterogeneity in

preferences and improves the behavioral realism of results (Hole 2008). Mixed logit also accounts for repeated choices by the same individual, a feature of most DCEs. Mixed logit has been widely used in transportation and environmental economics and is increasingly used in health economics (Regier et al. 2009; Blaauw et al. 2010; Kruk et al. 2010b). Details of estimating the mixed logit model are shown in Appendix SA2.

We estimated main effects mixed logit model and models with interaction terms between clinic attributes, gender, age, wealth, and mental health. Women and the poor are vulnerable to poor health outcomes due to underutilization of health care (Bhutta et al. 2010). War-related trauma may alter preferences as may generational shifts in expectations from the health system (Johnson et al. 2008). In all models, the cost variable was specified as fixed, all other clinic attributes as random, and the traditional healer opt-out variable as an alternative-specific constant (Hole 2008). Mixed logit models produce two main parameters: the mean utility and the standard deviation, the latter reflecting preference heterogeneity in the population. Significant preference heterogeneity suggests unmeasured factors influencing the strength and direction of preference (Kjaer and Gyrd-Hansen 2008). All mixed logit models were fit using Stata's *mixlogit* command (*Stata* v.11, StataCorp., College Station, TX, USA) and were specified with normally distributed parameters, independent covariance structure, and 500 Halton draws.

We performed several sensitivity and validity tests. We tested the data for attribute dominance (noncompensatory behavior), identifying respondents who always selected a clinic on the basis of one attribute irrespective of levels of other attributes, as this violates random utility theory and biases the results (Scott 2002). We analyzed models with and without these respondents. We examined the in-experiment predictive validity of the mixed logit model by comparing model predicted clinic choice in the fixed task with respondents' actual choice. Finally, we explored several other model specifications: categorical coding for price and wait times, nonlinear (quadratic and cubic) functions for cost, effects coding for attribute levels, and interactions between clinic attributes (covariance) (Brown et al. 2010). These analyses are described in Appendix SA2.

RESULTS

Of 1,464 eligible respondents recruited for household data collection, 1,434 (98.0 percent) completed the questionnaire. Fewer than half (46.0 percent) of

persons interviewed were women (Table 1). Nearly one-third (32.7 percent) of respondents were aged 18–29 years, while 43.1 percent were aged 30–49, and 24.1 percent were age 50 and older. Nearly half of respondents (42.3 percent) had never attended school of any kind, and only 0.8 percent had attended any college. On average, respondents reported 17.3 (SE 0.1) conflict-related traumatic experiences, with respondents in the top quartile reporting 24 (SE 0.1) conflict-related traumas. Respondents reported an average of 5.0 (SE 0.2) visits to formal health care providers and 26.5 (SE 1.4) visits to informal health care providers in the year preceding survey administration. Finally, nearly four-fifths (79.1 percent) of respondents reported being satisfied with their country’s current reliance on NGOs for management of public health facilities. However, 59.1 percent believe that the government should be the sole manager of health facilities in 10 years, while 26.4 percent believe that the government and NGOs should both be managing health facilities in 10 years (Table 2).

Nearly all (1,431/1,434; 99.8 percent) survey respondents participated in the DCE. All respondents who started the DCE completed all eight choice tasks. In total, data from 11,448 choice tasks were analyzed. Interviewers

Table 2: Attributes and Levels Used in DCE

<i>Attribute</i>	<i>Levels</i>
Waiting time	30 minutes 2 hours 4 hours
Respectful treatment	Clinic workers respect you Clinic workers do not respect you
Availability of medicines	Needed medicines are always in stock Needed medicines are not always in stock
Quality of the physical exam	The nurse examines you carefully The nurse does not examine you carefully
Cost*	50 Liberian dollars 200 Liberian dollars 500 Liberian dollars 1,000 Liberian dollars 1,500 Liberian dollars
Management	Government manages the clinic An NGO manages the clinic

Notes. Introductory text: Imagine that you are deciding where to get medical care when you are sick. Each card describes two possible health clinics. Please tell us which of the two clinics you would prefer to visit. If you do not like either clinic, you can decide to use a traditional healer instead. There are no right or wrong answers to these questions—we are only interested in learning about what is important to you in deciding where to seek care.

*1 USD = 66.6 Liberian Dollars.

reported that respondents did not appear to have difficulty understanding the DCE.

In the assessment for attribute dominance, we found that 41.0 percent of respondents always selected the clinic that offered a thorough physical exam and 10.9 percent always selected the clinic with available medicines. In adjusted logistic regression models, the respondents with a dominant preference for thorough exam were more likely to be females, older than 30, married, illiterate, and in poor health. Those with a dominant preference for medications were more likely to be male, poor, under 30, unmarried, literate, and in poor health. Fourteen respondents (1.0 percent) chose the traditional healer opt out for all eight choice tasks (4.2 percent of choice tasks). These participants were more likely to have symptoms of PTSD than other respondents.

Table 3 summarizes the DCE findings. The first model in panel A includes participants with dominant preferences. Here the greatest predictors of clinic preference were a high-quality physical examination (β 3.62, $p < .01$), followed by availability of medicines (β 1.71, $p < .01$), respectful treatment by clinic staff (β 0.35, $p < .01$), and clinical management by the government as compared with a NGO (β 0.13, $p < .01$). Respondents demonstrated a negative preference for higher costs (β -0.36, $p < .01$). Finally, respondents had a negative preference for the traditional healer opt out (β -0.38, $p < .01$). Removing respondents with dominant preferences for physical exam quality, medicines, and traditional healer yielded the output shown in second model of panel A. As expected, this model had attenuated estimates for exam quality (β 1.42, $p < .01$) and medicines (β 1.03, $p < .01$), compared with the first model. In both models, standard deviation estimates were significantly different from the null ($p < .01$) for all attributes except waiting time, suggesting substantial heterogeneity in preferences. The final model correctly predicted 92.5 percent of respondent choices in the fixed choice task.

The results from two interaction models are presented in Table 3. In a mixed logit model with an interaction term for gender (panel B), female respondents were significantly more likely to show an aversion to higher cost (β -0.36, $p < .05$) as compared with male respondents. Similarly, in a mixed logit model that included an interaction term for age (panel C), respondents under age 30 demonstrated a significantly larger negative preference for higher costs (β -0.31, $p < .05$) as compared with respondents age 30 and older. Further, respondents under 30 had a greater preference for the availability of medicines (β 0.25, $p < .01$) and a high-quality physical exam (β 0.24, $p < .01$). As in the main effects models, standard deviation estimates were

Table 3: Results of Mixed Logit Regression Models

	All Respondents				Excluding Respondents with Dominant Preferences			
	Mean	SE	SD	SE	Mean	SE	SD	SE
Panel A: Main Effects Models								
Attribute								
Waiting time (continuous in hours)	0.00	0.02	0.14	0.04**	0.00	0.02	0.13	0.03**
Clinic staff show respect	0.35	0.06**	1.13	0.07**	0.36	0.06**	1.04	0.07**
Medicines are always available	1.71	0.08**	1.91	0.09**	1.03	0.06**	0.85	0.06**
High-quality physical examination	3.62	0.12**	2.61	0.11**	1.42	0.06**	0.59	0.07**
Government manages facility	0.13	0.05**	0.69	0.08**	0.14	0.05**	0.66	0.07**
Cost (continuous in 1,000 LD ¹)	-0.36	0.05**			-0.35	0.05**		
Opt out: traditional healer	-0.38	0.09**			-0.66	0.09**		
Model diagnostics								
Number of respondents	1,431				674			
Number of observations	34,344				16,176			
Log likelihood	-5,332.4				-3,825.4			
Likelihood ratio χ^2	2,267.8				320.0			
Panel B: Model with Female Interaction Term								
	Mean			SE		SD		SE
Main effects								
Waiting time (continuous in hours)	-0.02			0.02		0.13		0.03**
Clinic staff show respect	0.37			0.08**		1.04		0.07**
Medicines are always available	1.02			0.07**		0.85		0.06**
High-quality physical examination	1.36			0.07**		0.60		0.07**
Government manages facility	0.07			0.07		0.66		0.07**
Cost (continuous in 1,000 LD ¹)	-0.20			0.07**				

Panel B: Model with Female Interaction Term

	Mean	SE	SD	SE
Opt out: traditional healer	-0.71	0.12**		
Female ×				
Waiting time (continuous in hours)	0.03	0.03		
Clinic staff show respect	-0.01	0.12		
Medicines are always available	0.04	0.11		
High-quality physical examination	0.14	0.10		
Government manages facility	0.17	0.11		
Cost (continuous in 1,000 LD ¹)	-0.36	0.11**		
Opt out: traditional healer	0.14	0.18		
Model diagnostics				
Number of respondents	674			
Number of observations	16,176			
Log likelihood	-3,815.8			
Likelihood ratio χ^2	320.8			

Panel C: Model with Age Interaction Term

	Mean	SE	SD	SE
Main effects				
Waiting time (continuous in hours)	0.00	0.02	0.14	0.03**
Clinic staff show respect	0.33	0.07**	1.05	0.07**
Medicines are always available	0.96	0.07**	0.85	0.06**
High-quality physical examination	1.35	0.07**	0.60	0.07**
Government manages facility	0.11	0.07	0.66	0.07**
Cost (continuous in 1,000 LD ¹)	-0.26	0.06**		

Table 3: Continued

Opt out: traditional healer		
Age <30 ×	− 0.73	0.11*
Waiting time (continuous in hours)		
Clinic staff show respect	− 0.01	0.04
Medicines are always available	0.12	0.13
High-quality physical examination	0.25	0.12*
Government manages facility	0.24	0.11*
Cost (continuous in 1,000 LD ¹)	0.12	0.12
Opt out: traditional healer	− 0.31	0.12**
Model diagnostics	0.25	0.20
Number of respondents	674	
Number of observations	16,176	
Log likelihood	− 3,817.2	
Likelihood ratio χ^2	322.0	

Note. Model excludes respondents with dominant preference for a high-quality physical examination and available medicines.
* $p < .05$, ** $p < .01$.

significantly different from the null ($p < .01$) for all attributes except waiting time. Results from two additional interaction models demonstrated that conflict-related traumatic experiences and wealth status did not significantly modify respondents' preferences for health service attributes. Results of other sensitivity analyses, including alternative model specifications, are shown in the Appendix SA2.

DISCUSSION

In choosing health care facilities for illness, rural Liberians expressed strong preference for technical quality of care, specifically a thorough physical exam and availability of medicines. The first of these was especially important to respondents—approximately three times as important as respectful treatment, even after removing respondents with dominant preferences from the analysis. While technical quality of medical care, a construct that embodies provider knowledge, skill, and competence and appropriate use of medicines and health care technologies, is difficult for patients to judge, provider effort made in physical examination and availability of medicines are evaluable by users and have been used previously in low-income settings to measure patient-perceived technical quality (Tembon 1996; Hanson et al. 2005).

By contrast, nontechnical or interpersonal aspects of quality were not as highly valued by respondents. While respectful treatment was associated with clinic preference, it was much less important than technical quality. The existing literature—almost all from industrialized countries—is mixed on the relative importance of technical versus nontechnical quality for users. For example, Cheraghi-Sohi et al. (2008) found that a thorough physical exam was the most highly valued attribute of a primary care visit in England, followed by continuity of care and seeing a friendly physician. In another British study, this time of emergency department visits, having a physician do the consultation and being informed about waiting time were more important than the quality of the consultation. Studies from high-income countries are difficult to compare directly because attributes such as continuity of care and patient control over decision making are less relevant in settings with massive health worker shortages and struggling health systems (Hjelmgren and Anell 2007).

The handful of studies of patient preferences in sub-Saharan Africa report different prioritization of technical versus nontechnical quality. Hanson et al. (2005) report that quality of physical examination was the most valued aspect of inpatient care in Zambia followed by staff attitude and availability of

drugs. On the other hand, in previous work in Tanzania on women's preferences for facility births, we found that provider attitude was more important than availability of drugs, although both were important drivers of preference (Kruk et al. 2009). A comparable DCE performed in rural Ethiopia where facility delivery rates are much lower than in Tanzania showed that availability of medicines was more important than a friendly provider (Kruk et al. 2010c). These results suggest that the relative value of different health service components is shaped by the nature of the service and the current state of the health system, as well as other local demand-side factors.

Although waiting time to see a clinician was identified as an important issue in our focus groups, in the DCE waiting time of up to 4 hours did not influence preferences for care. Other DCEs confirm the results of this study that waiting time is valued less than other nontechnical attributes such as continuity of care and choice of provider (Rubin et al. 2006; Gerard et al. 2008). By contrast, a ranking exercise in 41 countries found that prompt attention was the most important of eight nontechnical health care quality domains, which, among others, included communication and dignity (Valentine, Darby, and Bonsel 2008). This points to the influence of the instrument on measures of stated preference. For example, while short wait times may be highly desirable on a stand-alone basis, patients may be willing to trade longer waits for other attributes when the situation requires trade-offs, such as in a DCE.

This study also provided some empirical evidence on population expectations from government in a postconflict setting. In the survey, nearly eight in 10 respondents reported being satisfied with NGO management of health services—the system prevailing in Liberia today. The DCE reflected this finding: although statistically significant, government management was not a major predictor of current clinic preference. However, 59 percent of respondents stated that they expected government to be managing health services in 10 years, with 26 percent preferring joint management between government and NGOs and only 7 percent choosing NGO management. This suggests that while the population considers health care a government obligation, it can adjust this expectation in view of the current reality of low government capacity and predominantly external health sector funding.

There was substantial heterogeneity in preferences for all attributes other than waiting time. To understand whether demographic or health factors influenced preferences for clinical services, we estimated models with interaction terms for selected variables. We found that women and people under age 30 were more averse to higher cost than respondents on average. However, the inclusion of these participant variables did not eliminate the

heterogeneity in preferences, suggesting that unmeasured individual factors were important in individual preference formation.

One unexpected finding was that more than 41 percent of respondents were not willing to trade-off a high-quality physical exam for gains in other attributes (or fall in price) and more than 14 percent were not willing to do so for the availability of medicines. Because all DCEs are based on random utility theory that assumes willingness to trade among attributes, including these respondents in the analysis would bias the results, erroneously increasing the utility and willingness-to-pay for the dominant attributes. As a result, we excluded these respondents from our final models. While the magnitude of utility estimates for physical exam and medicines was lower without respondents with dominant preferences, these quality indicators remained the most influential attributes in the model.

The reasons for dominant or noncompensatory decision making vary. Respondents may use dominant preferences for one attribute as a decision aid if the scenarios are too complex (always choose the scenario where physical exam is thorough) or may be refusing to trade on the basis of an underlying belief that an attribute is nonnegotiable (Scott 2002). We constructed the DCE to be relatively simple, limiting the number of attribute levels and choice tasks and included pictorial representation of the attributes to ease cognitive burden. Participant debriefings did not indicate that respondents had difficulty understanding or completing the experiment. It is thus possible that the high prevalence of dominant preference for technical quality of care reflects participant innate beliefs, which in turn can offer useful insight into actual population preferences in facing a health care market. This may also have implications for policy: for example, populations with dominant preferences may be insensitive to improvement in other characteristics. Discrete choice studies should systematically assess the impact of respondents with dominant preferences on utility estimates to avoid biased results.

This study had several limitations: first, several methodological aspects of DCE analysis in general and mixed logit models specifically are unresolved. These include criteria for selection of random versus fixed attributes, preferred distribution for parameters, and the proportion of variability attributable to scale rather than preference heterogeneity (Hanson and Jack 2008; Kjaer and Gyrd-Hansen 2008). Future research will be needed to clarify these issues in analyzing choice data. Second, given that the study was carried out in a rural population, the results cannot be extrapolated to urban populations in Liberia. Third, and perhaps most important, all stated preference studies are only indicative of people's potential or hypothetical preference; validating this

work with revealed preference data from a policy experiment would be important.

This study contributes to the fledgling body of research on public preferences for the structure and organization of health care in low-income countries. While responsiveness of health care systems to population concerns is extensively studied in industrialized countries, there is little information about what matters to people in poor countries (Blendon et al. 2003; Blendon et al. 2006; Schoen et al. 2007). In a literature review of patient priorities for general care, all 57 studies were from high-income countries (Wensing et al. 1998). Furthermore, few studies in low-income countries are population based, instead focusing on patients or providers (Hanson et al. 2005; Peltzer 2009).

Understanding population preferences for health care provision in low-income settings is important for several reasons. Population preferences may help to explain poor utilization of essential services. Thus, even if health services are available in parts of Africa and Asia, men and women may choose not to use these if they do not meet their expectations of quality, convenience, or cost. This underutilization of essential services threatens achievement of global and national health targets, such as the MDGs. Conceptually, mismatch between preferred and available health services may be a separate and important barrier to access to care in low-income countries (McIntyre, Thiede, and Birch 2009).

Incorporating public expectations of health care in policy making also promotes health system accountability. Responsiveness to patient preferences is seen as increasingly important in high-income countries, where the notion of the patient as consumer has put pressure on health care systems to improve communication, provide more choice, and ensure respectful treatment (Institute of Medicine 2001; Martin 2008; Robinson and Ginsburg 2009). This emphasis on the needs and expectations of the user has not migrated to low-income countries, although it may have benefits for health and government legitimacy (Kruk et al. 2010a). Future work is needed to explore whether health systems that incorporate population preferences for care promote appropriate utilization of health care and improve health outcomes in low-income countries shouldering a high burden of disease.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

Appendix SA2. Technical Appendix.

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